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ABSTRACTS OF DEPOSITED ARTICLES

STATISTICAL CHARACTERISTICS OF CORRELATION FUNCTIONS OF SEQUENCES WITH LARGE ENSEMBLE

by

N.I. Smirnov

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By: N.I. Smirnov

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Block	Italic	Transliteration	Block	Italic	Transliteration
А а	*А а*	A, a	Р р	*Р р*	R, r
Б б	*Б б*	B, b	С с	*С с*	S, s
В в	*В в*	V, v	Т т	*Т т*	T, t
Г г	*Г г*	G, g	У у	*У у*	U, u
Д д	*Д д*	D, d	Ф ф	*Ф ф*	F, f
Е е	*Е е*	Ye, ye; E, e*	Х х	*Х х*	Kh, kh
Ж ж	*Ж ж*	Zh, zh	Ц ц	*Ц ц*	Ts, ts
З з	*З з*	Z, z	Ч ч	*Ч ч*	Ch, ch
И и	*И и*	I, i	Ш ш	*Ш ш*	Sh, sh
Й й	*Й й*	Y, y	Щ щ	*Щ щ*	Shch, shch
К к	*К к*	K, k	Ъ ъ	*Ъ ъ*	"
Л л	*Л л*	L, l	Ы ы	*Ы ы*	Y, y
М м	*М м*	M, m	Ь ь	*Ь ь*	'
Н н	*Н н*	N, n	Э э	*Э э*	E, e
О о	*О о*	O, o	Ю ю	*Ю ю*	Yu, yu
П п	*П п*	P, p	Я я	*Я я*	Ya, ya

*ye initially, after vowels, and after ъ, ь; e elsewhere.
When written as ё in Russian, transliterate as yё or ё.

RUSSIAN AND ENGLISH TRIGONOMETRIC FUNCTIONS

Russian	English	Russian	English	Russian	English
sin	sin	sh	sinh	arc sh	$\sinh^{-1}$
cos	cos	ch	cosh	arc ch	$\cosh^{-1}$
tg	tan	th	tanh	arc th	$\tanh^{-1}$
ctg	cot	cth	coth	arc cth	$\coth^{-1}$
sec	sec	sch	sech	arc sch	sech^{-1}
cosec	csc	csch	csch	arc csch	csch^{-1}

Russian	English
rot	curl
lg	log

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ABSTRACTS OF DEPOSITED ARTICLES[1]

STATISTICAL CHARACTERISTICS OF CORRELATION FUNCTIONS OF SEQUENCES WITH LARGE ENSEMBLE

N. I. Smirnov.
(VINITI - All Union Institute of Scientific and Technical Information).
No. 1457-70 dep. 17.2.70, 8 pages).

Suggested is an algorithm for determining combinations of M-sequences whose periodic cross-correlation functions are three-level (PFVKT). With the use of the Minsk-22 computer for n=31, 63, 127, 511, 1023 we found the numbers of primitive roots t_j that determine the numbers of M-sequences which form, with the M-sequence corresponding to the first polynomial, PFVKT. When n=1023, t_j will be:
t_1'=17, t_2=5, t_3=13, t_4=25, t_5=49, t_6=511.

If the numbers of indicated combinations of t_j with the first M-sequence are multiplied by the numbers of all N_m irreducible primitive polynomials (and their mirror images, then we will obtain all possible combinations with PFVKT. Each of the indicated combinations of M-sequences it makes it possible to form n more sequences by relative cyclical permutation of initial M-sequences and modulo 2 addition, which between themselves also form PFVKT. Of all the possible combinations of sequences with PFVKT $N_T = t_{jT} \cdot N_M (2+n)$. For n=1023, N_T=338000.

In asynchronous radio engineering systems with code separation of addresses when n>1023 the probability of the appearance of errors is determined not by the values of maximum outliers $U_{B\ MAKC}$, but by the statistical characteristics of the values of outliers of FAK

(autocorrelation functions) and FVK (cross-correlation functions): the mathematical expectation of outliers m_B and the root-mean-square divergence of the value of outliers σ_B. For determination of m_B and σ_B we computed on the Minsk-22 a large quantity of correlation functions (KF) of different types: aperiodic FVK (APFVK), APFAK, joint FVK (SFVK) of M-sequences and newly formed quasi-orthogonal sequences for $n \leqslant 1023$. As a result we found stable dependences of m_B and σ_B on n. In APFAK of M-sequences $m_{|B|}=0.32\ n$, $\sigma_{|B|}=0.26\ n$, $U_{B\ \text{MAKC}}=(0.7\text{-}1.25)\sqrt{n}$. In PFVK, SFVK, of M-sequences and PFVK, PFAKT of reformed sequences from the same initial combination $m_{|B|}=0.8\ n$, $\sigma_{|B|}=0.63\ n$, $U_{B\ \text{MAKC}}=(1.5\text{-}6)\sqrt{n}$. In APFVK of M-sequences, APFVK, APFAKT of reformed sequences from the same initial combination and APFVK from different initial combinations $m_{|B|}=0.54\ n$, $\sigma_{|B|}=0.48\ n$, $U_{B\ \text{MAKC}}=(1.4\text{-}5)\sqrt{n}$.

The obtained laws make it possible in many instances to avoid the computation of FK of sequences with $n \geqslant 2047$, which requires tens of hours of machine time.

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